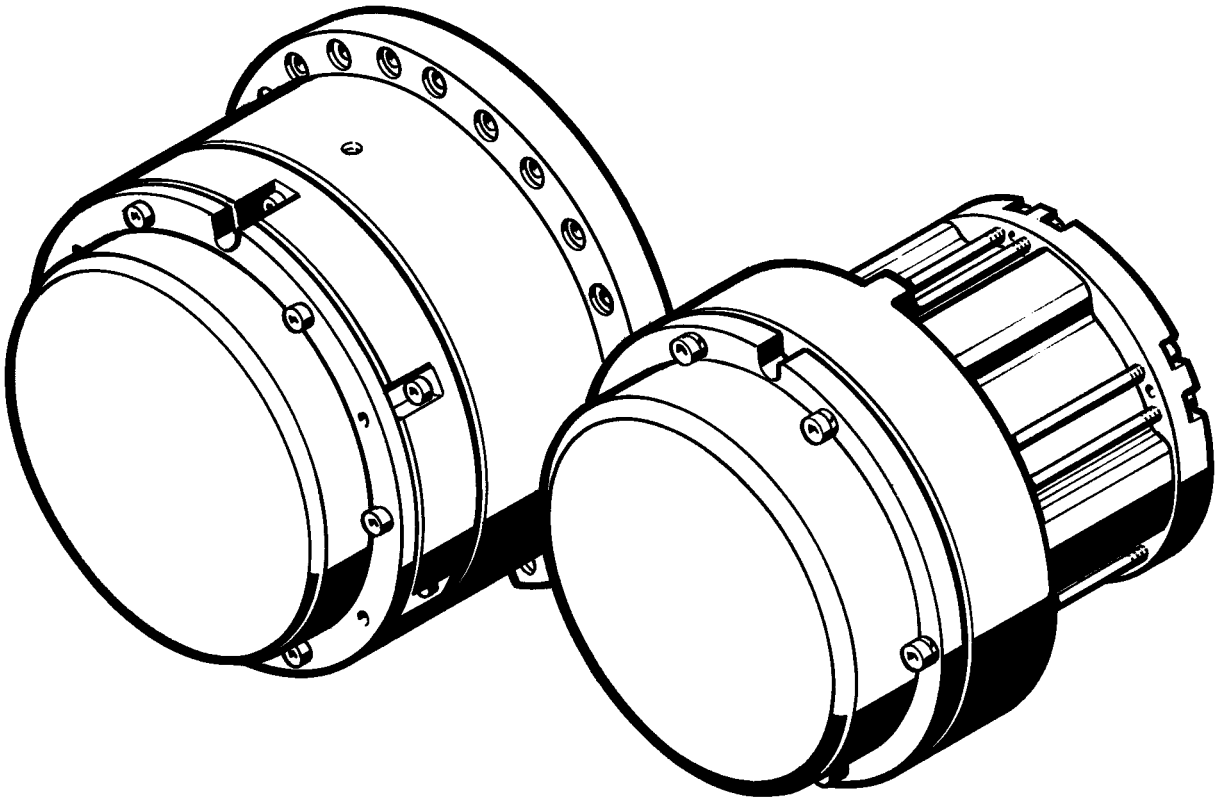
ISO 9001 CERTIFIED

502-ESB-001-02

INSTALLATION AND SERVICE MANUAL

FOR

E-STOP BRAKES



WARNING - Read this manual before any installation, maintenance and operation.

FORCE CONTROL

FORCE CONTROL INDUSTRIES, INC.

MANUFACTURERS OF MECHANICAL AND ELECTRICAL POWER TRANSMISSION EQUIPMENT

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E-Stop Brake
SERVICE MANUAL
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Section 1
DESCRIPTION AND OPERATION

1-1 DESCRIPTION

(See Figure 1.1)

Force Control's E-Stop Brakes are ***fast acting***, multiple surface, spring activated and pressure released braking units. The brake uses a multiple surface brake stack design which is sealed against normal environmental contamination. The brake stack friction material is a dry facing with heavy duty performance capability.

They are basically designed to stop and hold loads in position in the event of an emergency stop command, loss of air pressure to the brake or loss of power to the driven machinery.

Braking Torque is available in a wide range from 10,400 In. Lbs. to 236,000 In. Lbs.

1-2 OPERATION

When air pressure is interrupted to the brake, a heavy duty spring pack presses against the Piston (#3) and Thrust Plate (#5) which in turn compresses the brake stack. The brake stack consists of alternating Drive Plates (#13), which are pinned to the housing and Friction Discs (#12) which are locked to the splined Hub (#11). The Hub (#11) is keyed to the output shaft. When the plates and discs are pressed together by the force of the springs, friction between them locks them together, stopping any shaft rotation.

When air pressure is restored, the air pressure forces the Piston (#3) back releasing the pressure on the brake stack allowing the output shaft to rotate.

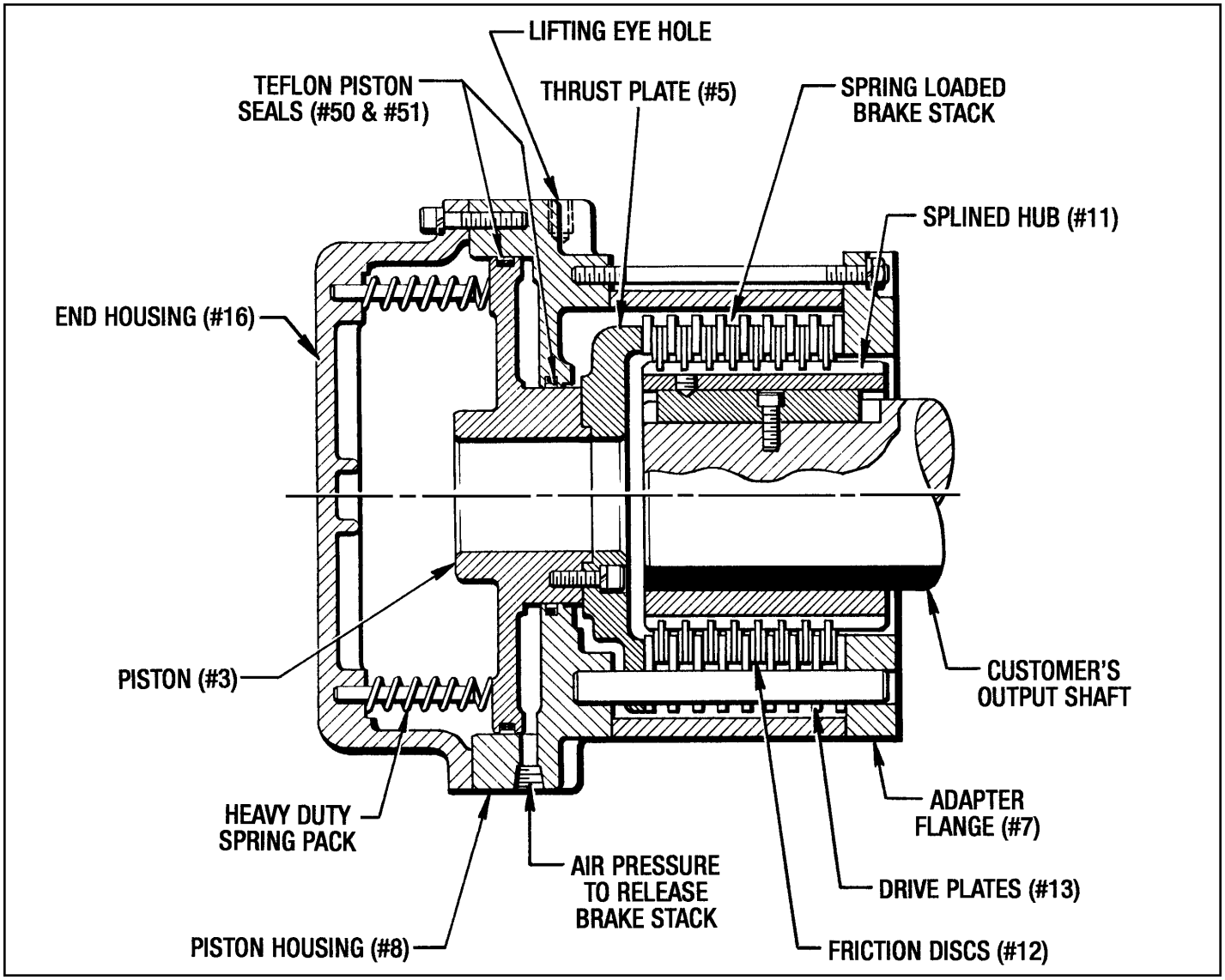

Figure 1.1 - Cross Section through E-Stop Brake

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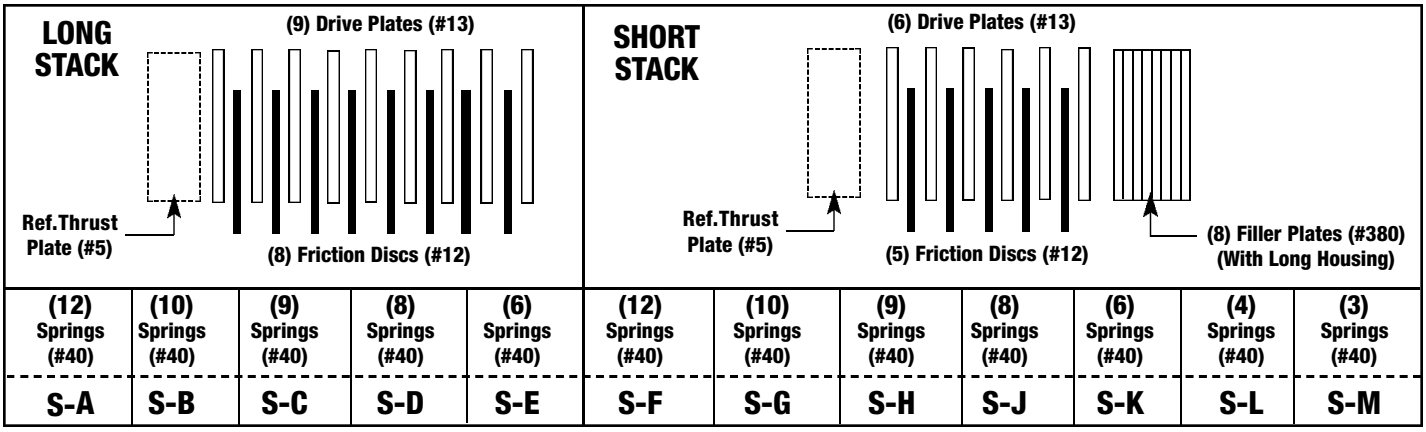
Section 2
SPECIFICATIONS

Small E-Stop Brake Torque Specifications

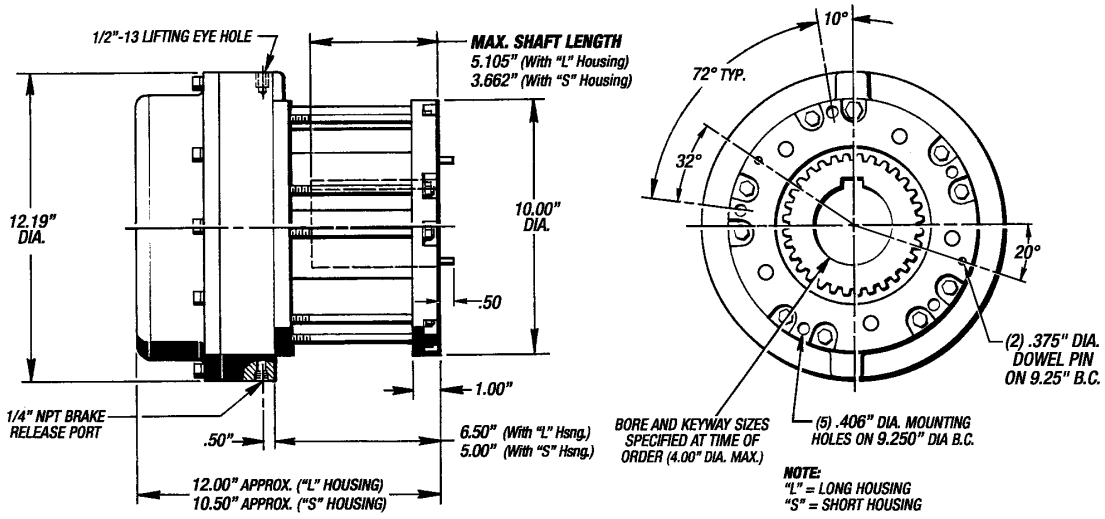
ASSEMBLY CONFIGURATION		NOMINAL STATIC TORQUE (Lb. In.)	PRESSURE TO RELEASE (PSI)	CYCLIC WK² (Lb. Ft.²)	PISTON VOLUME (Cu. In.)
LONG STACK	S-A	67,000	52	0.78 With Long Housing	15
	S-B	55,800	44		
	S-C	50,200	39		
	S-D	44,700	35		
	S-E	33,500	26		
SHORT STACK	S-F	41,900	52	0.55 With Short Housing --- 0.78 With Long Housing	15
	S-G	34,900	44		
	S-H	31,400	39		
	S-J	27,900	35		
	S-K	20,900	26		
	S-L	13,900	17		
	S-M	10,400	13		

Small E-Stop Brake Torque Assembly Configurations



(12) Springs (#40)	(10) Springs (#40)	(9) Springs (#40)	(8) Springs (#40)	(6) Springs (#40)	(12) Springs (#40)	(10) Springs (#40)	(9) Springs (#40)	(8) Springs (#40)	(6) Springs (#40)	(4) Springs (#40)	(3) Springs (#40)
S-A	S-B	S-C	S-D	S-E	S-F	S-G	S-H	S-J	S-K	S-L	S-M

Small E-Stop Brake Dimensional Specifications



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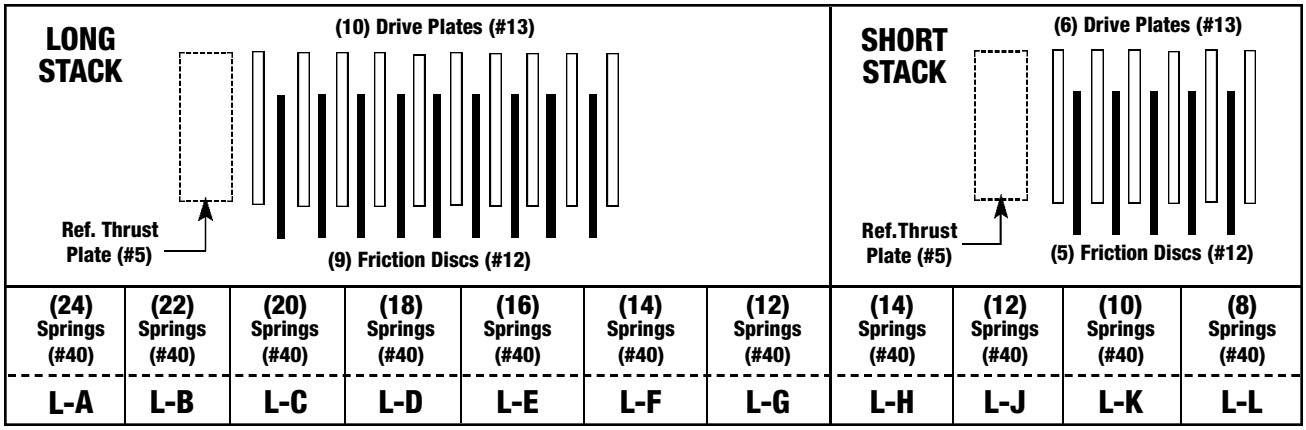
Large E-Stop Brake Torque Specifications

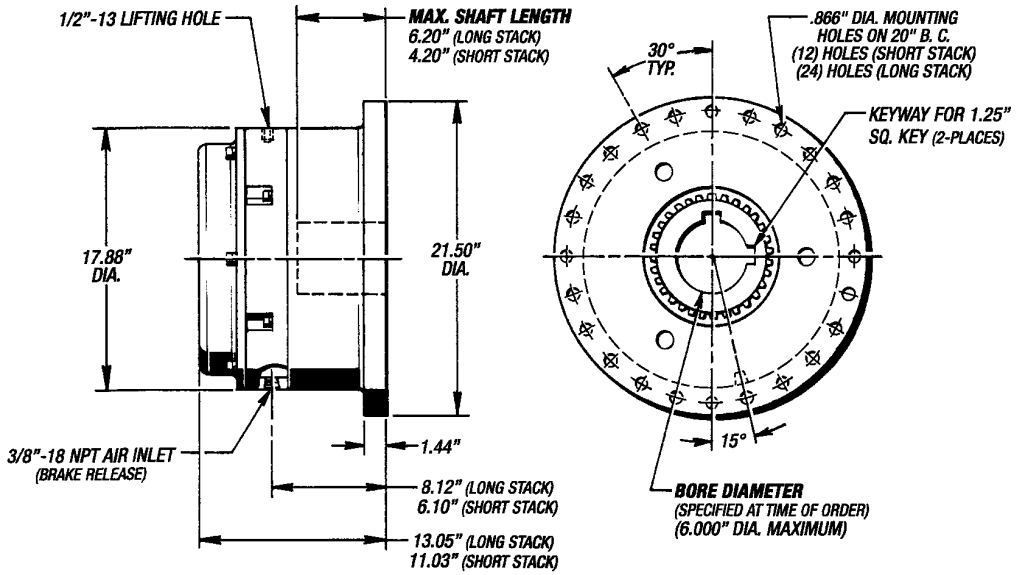
ASSEMBLY CONFIGURATION		NOMINAL STATIC TORQUE *(Lb. In.)*	PRESSURE TO RELEASE *(PSI)*	CYCLIC WK^2 *(Lb. Ft.^{2})*	PISTON VOLUME *(Cu. In.)*
LONG STACK	L-A	236,000	70	(6" Bore) 5.70 ---------- (5" Bore) 6.35	47
	L-B	216,300	64		
	L-C	196,600	58		
	L-D	177,000	52		
	L-E	157,300	47		
	L-F	137,600	41		
	L-G	118,800	35		
SHORT STACK	L-H	103,900	57	(4-3/4" Bore) 3.47 ---------- (3-7/8" Bore) 4.00	47
	L-J	89,000	49		
	L-K	74,200	41		
	L-L	59,400	33		

Large E-Stop Brake Torque Assembly Configurations



(24) Springs (#40)	(22) Springs (#40)	(20) Springs (#40)	(18) Springs (#40)	(16) Springs (#40)	(14) Springs (#40)	(12) Springs (#40)	(14) Springs (#40)	(12) Springs (#40)	(10) Springs (#40)	(8) Springs (#40)
L-A	L-B	L-C	L-D	L-E	L-F	L-G	L-H	L-J	L-K	L-L

Large E-Stop Brake Dimensional Specifications



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Section 3
INSTALLATION

IMPORTANT SAFETY PRECAUTIONS

The E-Stop Brake Units described in this manual must not be installed in any manner except as specified herein, and must not be operated at speeds, torque loads or temperatures other than those specified in this manual. Failure to limit operation of the brakes to the conditions specified could damage the brake units and may cause malfunction or damage to interconnecting equipment, injury to personnel and void the warranty.

Before attempting any adjustments, removal or repair of E-Stop Brake Units be sure to ***disconnect and lock out all power to the machinery to which they are connected.*** The devices are spring set/pressure released and were designed to stop and hold loads in position in the event of an emergency stop command or loss of power to the machinery. Some machines may have stopped conditions where the spring set brake is holding a vertical or inclined load in a raised or partially raised position. Members of the machinery that could free fall if the brake is released or disconnected should be pinned mechanically in place and blocked or supported with cribbing to prevent movement of the machinery.

Absolutely no work should be performed on the E-Stop Brake devices until adequate safety precautions are taken and the machinery is safe to work on.

3-1 REMOVING OLD BRAKE

1. If this Installation is to be a retrofit, then disconnect the pneumatic air lines to the old brake.
2. Remove the (5) mounting screws and lockwashers and take the old brake off the drive output shaft.

   NOTE: There are (5) 3/8”-24 mounting screws for the Small E-Stop Brake and (12) 5/8”-11 mounting screws for the Large E-Stop Brake.
3. Take the old Hub and Key off the output shaft.

   NOTE: Th e Small E-Stop Brake has only (1) key and the Large E-Stop Brake has (2) keys.

3-2 INSTALLING E-STOP BRAKE

(See Figure 6.1 for Small E-Stop Brake and Figure 6.2 for Large E-Stop Brake.)

(Small E-Stop Brake)

1. First check the output shaft and brake mounting surface for any nicks or burrs. Clean up and deburr if necessary.
2. Attach Key (#72) to the output shaft with Screw (#76).
3. Lubricate the output shaft with white grease and slide the Hub (#11) on to it. Align the set screw hole in the hub with the indent in the key. Tighten Set Screw (#107). **Use Blue Loctite #242 on Set Screw .**

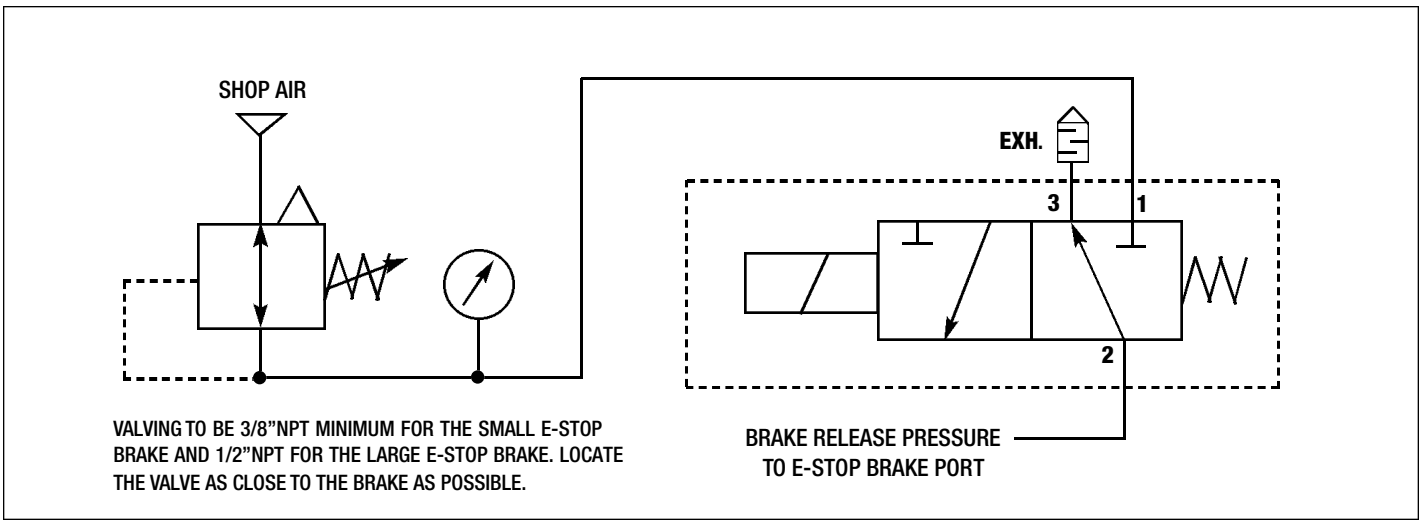
SHOP AIR
EXH.
3
1
2
VALVING TO BE 3/8”NPT MINIMUM FOR THE SMALL E-STOP BRAKE AND 1/2”NPT FOR THE LARGE E-STOP BRAKE. LOCATE THE VALVE AS CLOSE TO THE BRAKE AS POSSIBLE.
BRAKE RELEASE PRESSURE TO E-STOP BRAKE PORT

Figure 3.1 - Pneumatic Control Circuit

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4. Visually check to see if the teeth in the Friction Discs (#12) are aligned with each other. Apply 50 to 60 PSI to the brake port to release the brake stack and align the teeth if necessary.

5. Attach a 1/2”-13 eye bolt into the top of the brake and attach an overhead hoist to it.

   Slide the Brake Assembly on to the Hub (#11) and align the (2) Dowel Pins (#211) in the Adapter Plate (#7) with the dowel pin holes in the mounting face. Attach with the (5) 3/8”-16 mounting bolts and (5) 3/8” Lockwashers which are customer furnished. **Use Red Loctite #262 or #282 Thread-locker. Torque to 34 Ft. Lbs.**

   CAUTION - Be very careful not to damage the spline teeth in the Friction Discs (#12) when engaging the Hub (#11) spline.

6. Hook up pneumatic valve and piping. *(See Figure 3.1 for Pneumatic Control Circuit.)*

(Large E-Stop Brake)

1. First check the output shaft and brake mounting surface for any nicks or burrs. Clean up and deburr if necessary.

2. Attach (2) Keys (#72) to the output shaft with (2) Screws (#76).

3. Lubricate the output shaft with white grease and slide the Hub (#11) on to it. Align the (2) set screw holes in the hub with the indent in each Key (#72). Tighten both Set Screws (#107). **Use Blue Loctite #242 on both Set Screws.**

4. Visually check to see if the teeth in the Friction Discs (#12) are aligned with each other. Apply 50 to 60 PSI to the brake port to release the brake stack and align the teeth if necessary.

5. Attach a 1/2”-13 eye bolt into the top of the brake. and attach an overhead hoist to it.

   Slide the Brake Assembly on to the Hub (#11). The brake will require either (12) or (24) 20 mm mounting bolts, depending on the brake torque. Check the brake adapter plate for the quantity required. Attach the brake with the correct quantity of mounting bolts and lockwashers, which are both customer furnished. **Use Red Loctite #262 or #282 Thread-locker. Torque to 287 Ft. Lbs.**

   CAUTION - Be very careful not to damage the spline teeth in the Friction Discs (#12) when engaging the Hub (#11) spline.

6. Hook up pneumatic valve and piping. *(See Figure 3.1 for Pneumatic Control Circuit.)*

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Section 4
TROUBLE SHOOTING

4-1 TROUBLE SHOOTING CHART

TROUBLE	POSSIBLE CAUSE	CORRECTION
A. Brake fails to engage properly.	Piston sticking or binding.	Disassemble to extent necessary and inspect for damaged parts.
	Weak or broken spring.	Replace as needed.
	Air pressure not exhausting or slow in exhausting.	Check air valve and exhaust muffler and replace if necessary.
	Worn friction surfaces.	Check parts for wear and replace if necessary.
B.Brake fails to disengage properly.	Low air pressure.	Increase air pressure. (See Section 2)
	Piston sticking or binding.	Disassemble to extent necessary and inspect for damaged parts.
	Piston seals leaking. (See below)	Disassemble to extent necessary and inspect for damaged parts.
	Air valve regulator not functioning properly.	Check valve operation and replace if necessary.
C. Noise and vibration.	Improper or loose mounting to Cymonic or Machine Drive.	Check mounting and correct. If partial disassembly is required, see Section 3 Installation.
D. Unit overheats. (Temp. over 200° F.)	Brake not disengaging properly, causing excessive slippage.	Refer to Trouble B.

4-2 CHECKING PISTON SEALS FOR LEAKAGE

(See Figure 4.1)

1. Connect the Pneumatic Testing Setup as shown in *Figure 4.1* to the 1/4" NPT or 3/8" NPT Brake Pressure Port.
2. Crack the shut-off valve until the air pressure reads about 80 PSI on the pressure gauge and then quickly shut the air off.
3. Observe the pressure gauge to see if the air pressure stays the same or drops. If the air pressure stays the same or drops slowly the piston seals are okay. If the pressure drops rapidly (more than 5 PSI in 5 seconds), the piston seals are leaking and will need to be replaced.

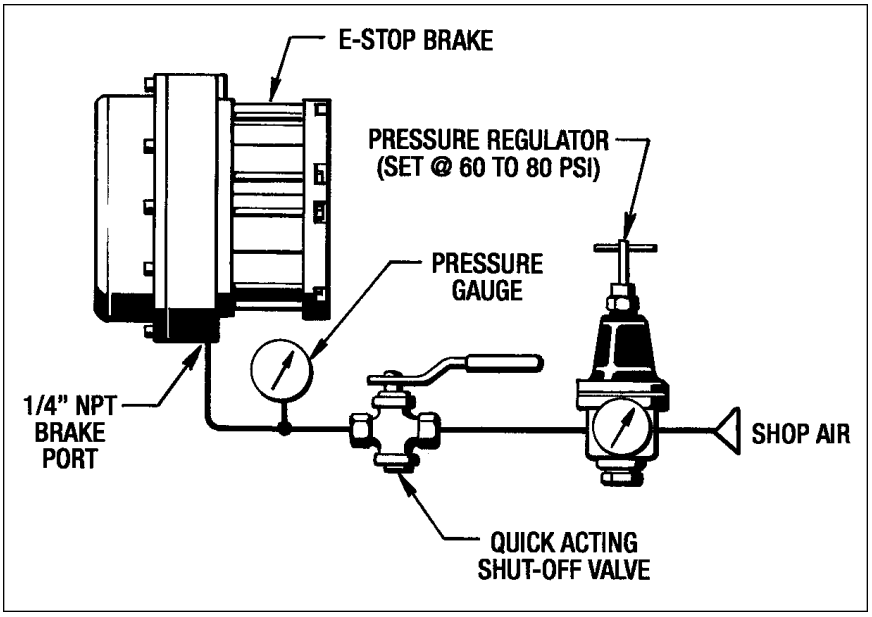

Figure 4.1 - Checking Piston Seals for Leakage

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Section 5
REPAIR and REPLACEMENT

IMPORTANT SAFETY PRECAUTIONS

Before attempting any adjustments, removal or repair of E-Stop Brake Units be sure to ***dis - connect and lock out all power to the machinery to which they are connected.*** The devices are spring set/pressure released and were designed to stop and hold loads in position in the event of an emergency stop command or loss of power to the machinery. Some machines may have stopped conditions where the spring set brake is holding a vertical or inclined load in a raised or partially raised position. Members of the machinery that could free fall if the brake is released or disconnected should be pinned mechanically in place and blocked or supported with cribbing to prevent movement of the machinery.

Absolutely no work should be performed on the E-Stop Brake devices until adequate safety precautions are taken and the machinery is safe to work on.

5-1 GENERAL INFORMATION

Unless the brake is to be completely overhauled, it should be disassembled only to the extent necessary to gain access to the worn or damaged parts.

Refer to Figure 6.1 for a visual reference to all parts to be disassembled, replaced and reassembled.

A fine stone or crocus cloth may be used to remove minor surface defects from parts, if the operation or sealing action of the part is not affected. The use of coarser abrasives or other machining methods should not be attempted. Otherwise damaged parts should be replaced.

A. Replacement is recommended for the following parts when needed:

1. Replace all O-Rings and Liners removed during disassembly.
2. Replace Friction Discs and Drive Plates as a complete set.

B. Note the following general reassembly instructions as applicable:

1. Lubricate O-Rings with a light coat of vaseline or equivalent immediately before assembly and installation of mating parts.
2. Use “Royal Purple” synthetic lubricant (or equivalent) sparingly on the Liners (#51) and (#50) and mating surfaces of the End Housing (#16) and Piston (#3) at reassembly.

5-2 CLEANING AND INSPECTION

Clean metal parts in a suitable solvent and dry with low pressure compressed air. The Drive Plates (#13) can be cleaned in a solvent **but do not clean Friction Discs (#12) in solvent.** (Solvent will damage the friction material used on the Friction Discs.) Use only a clean, dry and lint free rag to clean the Friction Discs (#12). Clean drive plates and friction discs one at a time, keeping them in the same order as they were when removed. After cleaning, inspect parts for cracks, distortion, scoring, nicks, burrs or any other damage that would affect the operation of the brake.

WARNING - Petroleum based cleaning solvents are extremely flammable. Open flames or smoking by any personnel in the vicinity of these solvents is extremely hazardous and MUST NOT BE PERMITTED.

Pay particular attention to the following:

1. Check the Friction Discs (#12) wear surfaces for scoring, galling or any evidence of uneven wear.
2. Check the Drive Plates (#13) for scoring or galling. Make sure they are flat. If a perceptible ridge is worn in the drive plate where it mates with a friction disc, it should be replaced.
3. Carefully check the piston and bore surfaces for nicks, scratches, scoring or other damage which would affect the operation or cause leakage.
4. Look for grooves in the Hub (#11) and Dowel Pins (#210)

5-3 SMALL E-STOP BRAKE DISASSEMBLY PROCEDURE

The Small E-Stop Brake must first be removed from the Cymonic Drive before the brake can be disassembled. *(See Figure 5.1)*

1. Remove the (5) Mounting Bolts and Lockwashers from the Adapter Plate (#7) that holds the Brake to the Cymonic Drive.

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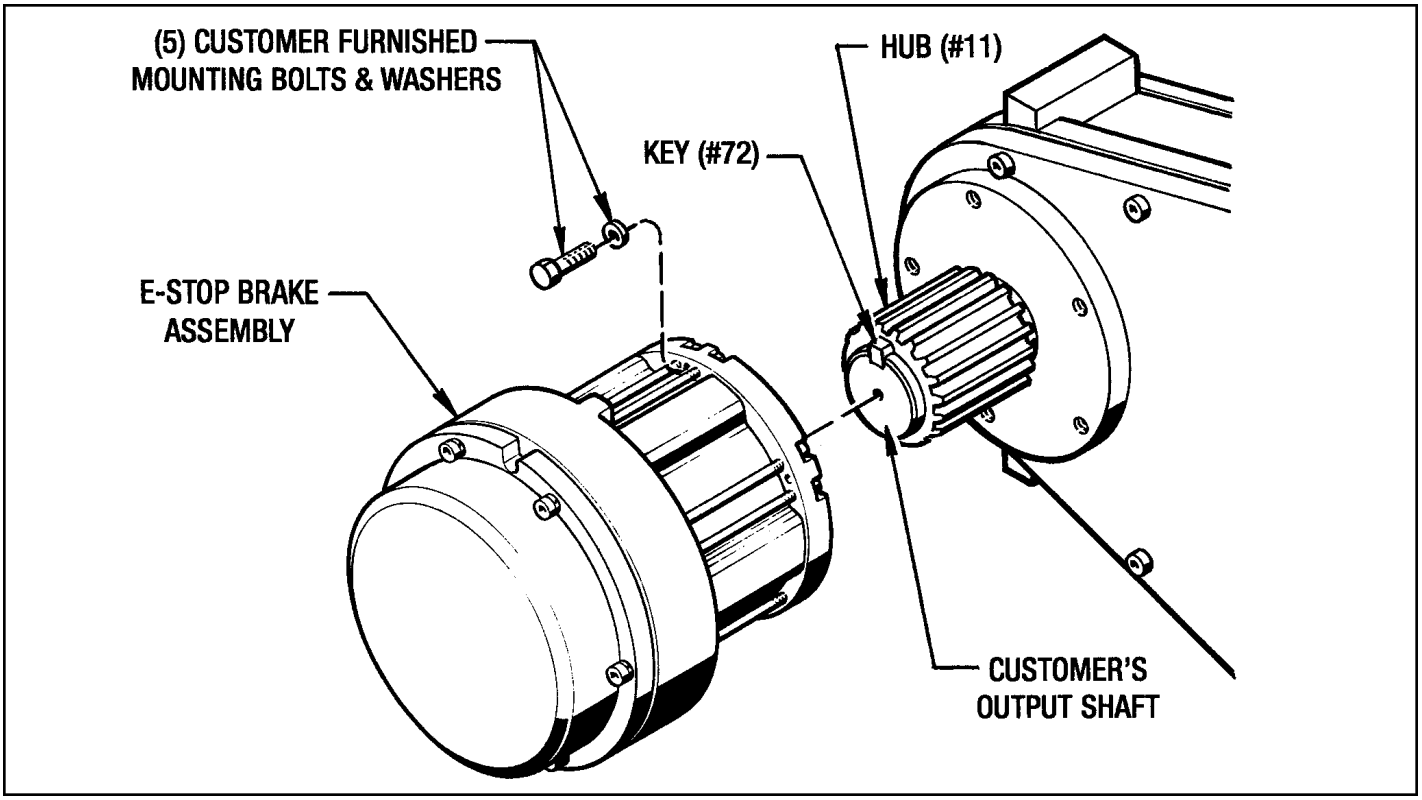

Figure 5.1 - Removing the Small E-Stop Brake Assembly

2. Pull the Brake Assembly away from the Cymonic Drive and the Hub (#11) which will stay on the output shaft.
3. To remove the Hub (#11) from the output shaft just loosen the Set Screw (#107) and pull it off the shaft.
4. Remove the (10) Hex Nuts (#121) and (10) Lockwashers (#122) from the (10) Studs (#120). Lift the Outer Brake Assembly off.
5. The Main Housing (#9) can just be lifted off the Brake Stack and the Adapter Plate (#7).
6. The **Brake Stack** can now be removed from the (5) Dowel Driver Pins.(#210) that are pressed into the Adapter Plate (#7).
7. Back the (6) Screws (#66) out of the End Housing (#16) in an even and consistent manner.

CAUTION

This End Housing is under spring pressure so use caution in removing these (6) screws to avoid any personal injury.

8. Lay the brake with the Piston Housing (#8) in an up position. Lift the Piston Housing (#8) off the End Housing (#16). Make a sketch of the placement of the Springs (#40). This will help at Reassembly. Remove the Springs (#40). **Correct spring placement is also shown in Figure 5.2 for torque adjustment in the field.**
9. Remove the (3) Screws (#65) and (3) Lockwashers (#73) from the Thrust Plate (#5) and separate the Thrust Plate (#5) from the Piston (#3). Push the Piston out of the Piston Housing (#8).
10. If the Piston Seals need replaced then pry the Liner (#51) and (2) O-Rings (#44) out from the Piston (#3).

    Remove the Liner (#50) and O-Ring (#43) from the Piston Retainer (#8).

    Discard the Liners and O-Rings. They will need to be replaced with new ones at reassembly.

5-4 SMALL E-STOP BRAKE REASSEMBLY PROCEDURE

1. Reinstall a new O-Ring (#43) and Liner (#50) back into the Piston Retainer (#8). Lubricate the O-Ring with Vaseline (or equivalent) first.

   Lubricate the (2) O-Rings (#44) with Vaseline (or equivalent) and install them into the Piston (#3).

   Install the O.D. Liner (#51) on the Piston (#3).
2. Coat the surfaces indicated in Figure 5.3 with “Royal Purple” synthetic lubricant (or equivalent) and insert the Piston (#3) into the Piston Retainer (#8).
3. Attach the Thrust Plate (#5) with (3) Lockwashers (#73) and (3) Screws (#65) to the Piston (#3). **Torque to 25 Ft. Lbs.**

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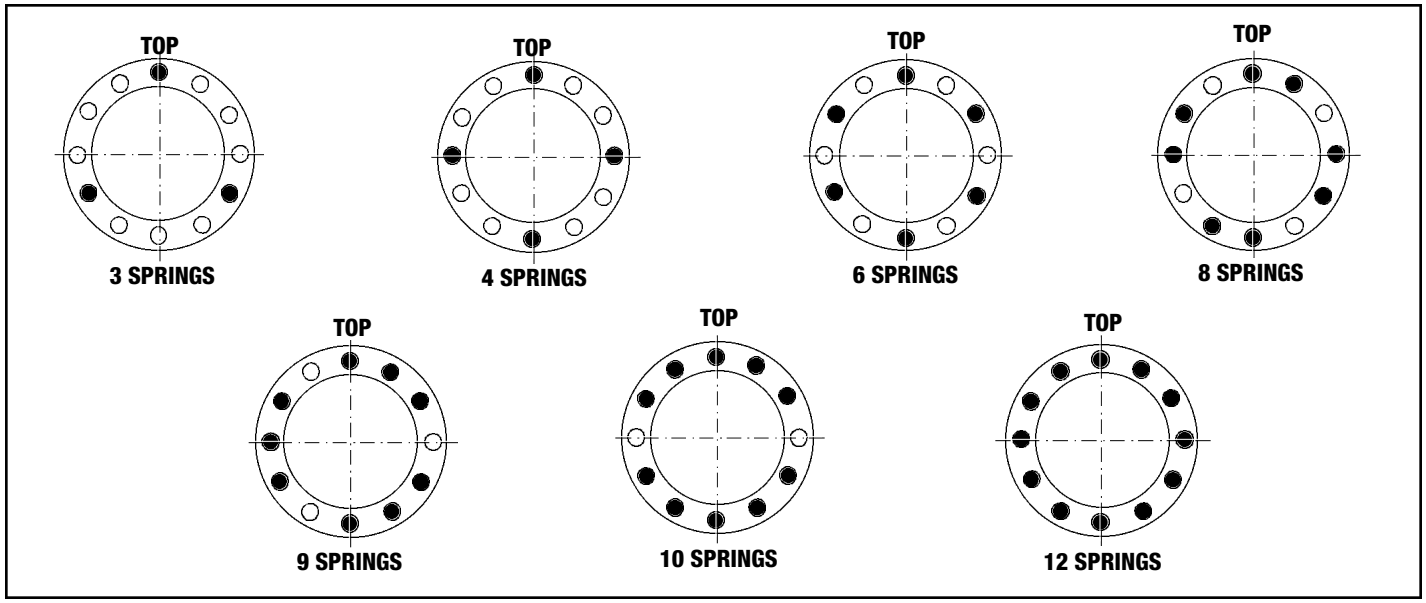

Figure 5.2 - Small E-Stop Brake Spring Placement

4. Place the correct number of Springs (#40) over the Pins (#54) in the End Housing (#16) for your desired Torque. See Figure 5.2 for correct spring placement.

   White grease can be used to hold them in place.

5. Attach the End Housing (#16) to the Piston Housing (#8) with the (6) Lockwashers (#74) and (6) Screws (#66). Tighten in an even manner to compress the springs properly. **Torque to 25 Ft. Lbs.**

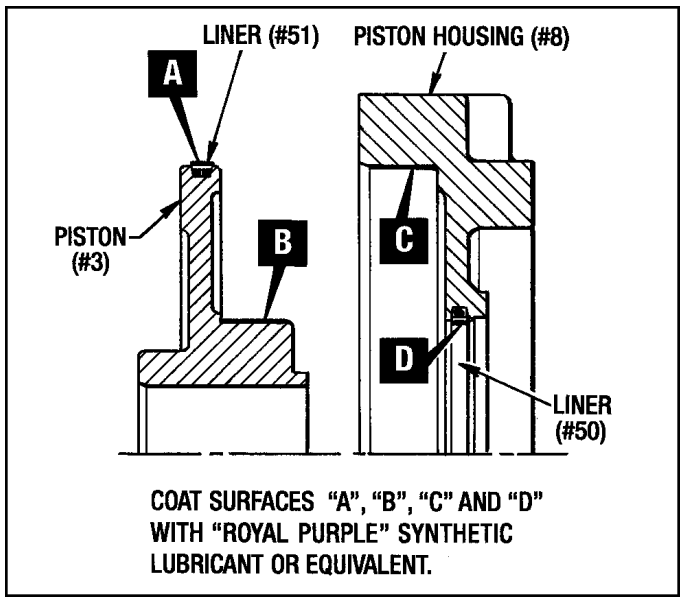

Figure 5.3 - Installing Piston (#3) into Piston Housing (#8)

6. If the (10) Studs (#120) was removed from the Piston Housing (#8) install them at this time. **Use Blue Loctite #242 on the threads.**

7. Place the Main Housing (#9) on the Piston Housing (#8) using the (2) Pins (#139) for positioning.

8. Install the Brake Stack into position onto the Pins (#210). Start with a Drive Plate (#13), then a Friction Disc (#12), then another Drive Plate (#13), etc. Ending with a Drive Plate (#13). Be sure to align the spline teeth in the Friction Discs (#12) up with each other.

   Horizontal Installation - If Filler Plates (#380) are used they will be installed at the opposite end of the Brake Stack from the Piston.

   Vertical Installation - If Filler Plates (#380) are used they will be installed at the lower or down end of the Brake Stack.

   NOTES: Depending on which Assembly Configuration you have, there will be (9) Drive Plates (#13) and (8) Friction Discs (#12) or (6) Drive Plates (#13) and (5) Friction Discs (#12).

   Filler Plates (#380) are used with a "L" (long) housing for Ass'y. Configurations "S-F" through "S-M".

9. Place the Brake Stack and Adapter Plate Sub-Assembly onto the Main Housing (#9) aligning the (10) Studs with the holes in the Adapter Plate (#7).

   Make sure the (3) Pins (#210) align up with the (3) holes in the Thrust Plate (#5).

   Attach with (10) Lockwashers (#122) and (10) Screws (#121). **Torque to 30 Ft. Lbs.**

10. Attach the Hub (#11) and Brake Assembly with the same procedure given in Section 3 INSTALLATION.

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5-5 REMOVING LARGE E-STOP BRAKE

The Large E-Stop Brake does not have to be removed from the machine before the brake can be disassembled. If you are not removing the whole brake from the machine go to **5-6 DISASSEMBLY PROCEDURE Steps 2 to Steps 8** and remove the End Housing (#16) and the Piston Housing (#8) for access to the Piston Liners and the Brake Stack.

To remove the whole brake from the machine complete the following 5 Steps *(See Figure 5.4)*

1. Install a 1/2"-13 eye bolt into the top hole of the Piston Housing (#8). Attach an overhead crane to the eye bolt.
2. Remove the (12) mounting bolts and lockwashers that attaches the brake to the machine.
3. Pull the Brake Assembly straight back off the machine face and the Splined Hub (#11) which will remain attached to the machine output shaft.
4. To remove the Hub (#11) from the machine output shaft just loosen the (2) Set Screws (#107) and pull it off of the shaft.
5. The (2) Keys (#72) can be taken out of the output shaft by removing the (2) Screws (#76).

5-6 LARGE E-STOP BRAKE DISASSEMBLY PROCEDURE

(See Figure 6.2 for a reference to all parts.)

1. Set the brake on a work bench with the End Housing (#16) facing upward.
2. Evenly loosen and remove the (6) Screws (#67) and (6) Lockwashers (#74) that holds the End Housing (#16) to the Piston Housing (#8).

CAUTION

This End Housing is under spring pressure so use caution in removing these screws to avoid personal injury.

3. Lift the End Housing (#16) off and remove the Springs (#40). The Pins (#54) will remain in the End Housing (#16) which will tell you where the springs go at Reassembly. Correct Spring Placement is also shown in Figure 5.5 if you wish to change the Braking Torque in your shop.
4. Remove the (6) Screws (#66) and (6) Lockwashers (#74) from the Piston Housing (#8).
5. Insert (3) 1/2"-13 x approx. 5" Lg. Jack Screws into (3) of the tapped holes in the Piston Housing (#8). There are (6) tapped holes. Use every other one. Tighten down evenly to release the Piston Housing from the (3) Driver Pins (#210) in the Main Housing (#9).

   Lift the Piston Housing and Piston Sub-Assembly up and off the Main Housing (#9).
6. The **Brake Stack** can now be removed from the Main Housing (#9) and the (3) Driver Pins (#210).

The Piston (#3) and the Thrust Plate (#5) need to be taken apart to replace the Piston Seals and O-Rings.

7. Take the (4) Screws (#65) and (4) Lockwashers (#73) out of the Thrust Plate (#5) and take it off of the Piston (#3). Push the Piston (#3) out of the Piston Housing (#8).

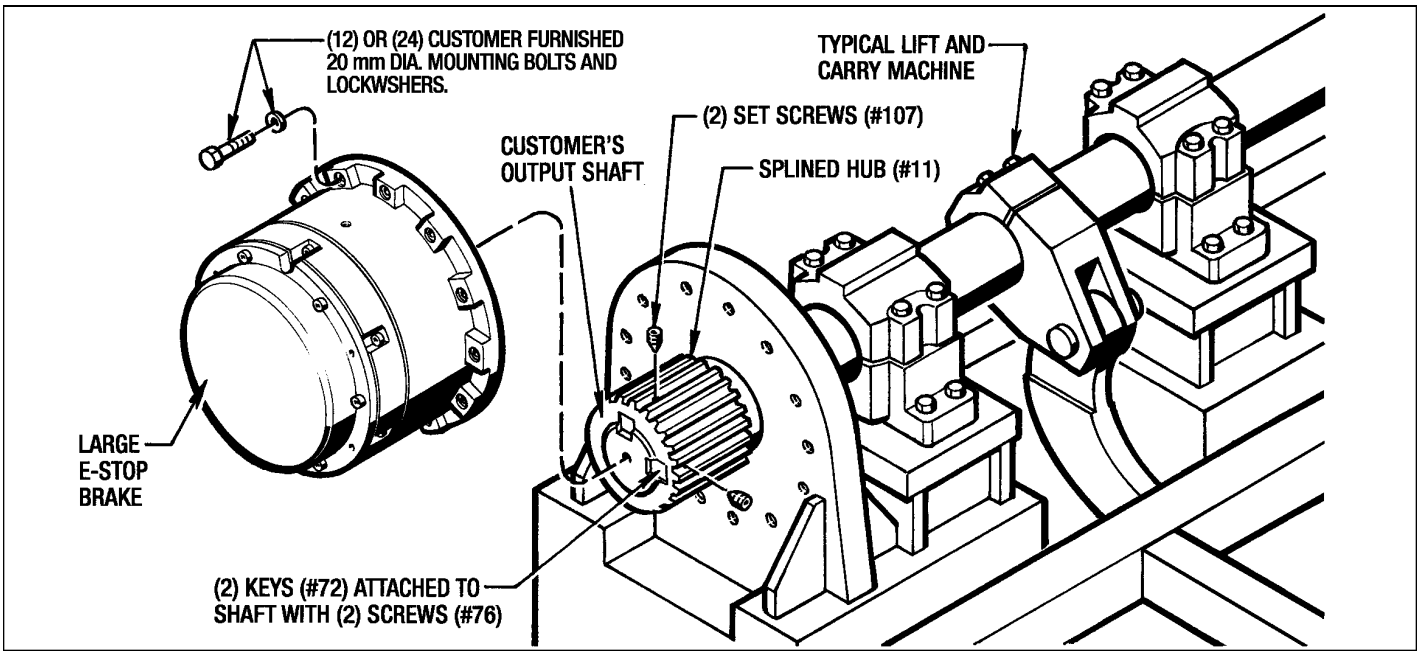
(12) OR (24) CUSTOMER FURNISHED 20 mm DIA. MOUNTING BOLTS AND LOCKWSHERS.
TYPICAL LIFT AND CARRY MACHINE
(2) SET SCREWS (#107)
CUSTOMER'S OUTPUT SHAFT
SPLINED HUB (#11)
LARGE E-STOP BRAKE
(2) KEYS (#72) ATTACHED TO SHAFT WITH (2) SCREWS (#76)

Figure 5.4 - Removing Large E-Stop Brake From Machine

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8. Pry the Piston Liner (#51) and the (2) O-Rings (#44)out of the piston groove.

   Also remove the Liner (#50) and O-Ring (#43) from the Piston Housing (#8).

   Discard the Liners and O-Rings. They will need to be replaced with new ones at Reassembly.

5-7 LARGE E-STOP BRAKE REASSEMBLY PROCEDURE

If you did not remove the whole brake from the machine then complete Steps 1, 2 and 3 to reassemble the Piston Housing and Piston Sub-Assembly.

A new Brake Stack can just be installed on the Hub (#11) which is still attached to the machine output shaft. See Step 6.

Attach the Piston Housing (#8) to the Main Housing (#9). **See Step 7.**

Attach the End Housing (#16) with the proper amount of Springs (#40) to the Piston Housing (#8). **See Step 10.**

1. Reinstall a new O-Ring (#43) and Liner (#50) back into the Piston Housing (#8). Lubricate the O-Ring with Vaseline (or equivalent) first.

   Lubricate the (2) O-Rings (#44) with Vaseline (or equivalent) and install them into the Piston (#3).

   Install the O.D. Liner (#51) on the Piston (#3).

2. Coat the surfaces indicated in Figure 5.5 with "Royal Purple" synthetic lubricant (or equivalent) and insert the Piston (#3) into the Piston Housing (#8). **Be very careful not to damage the Teflon Liners (#50) and (#51) when inserting the piston.**

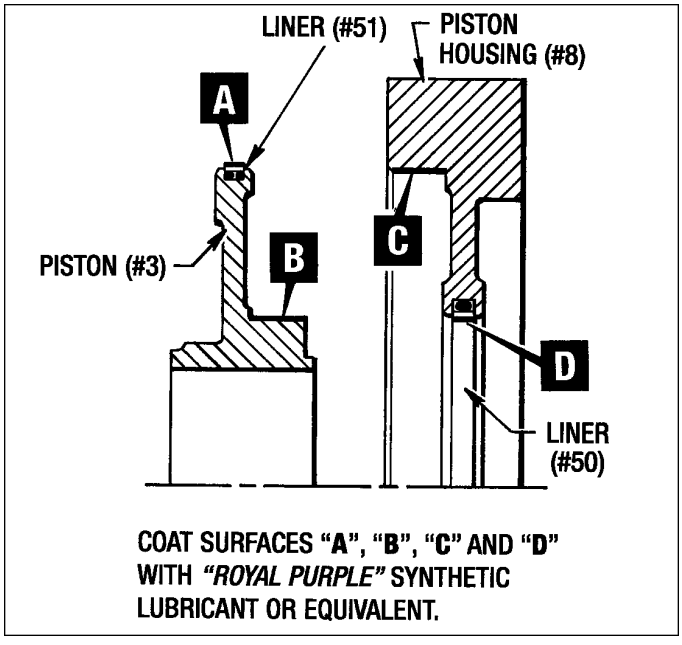

Figure 5.5 - Installing Piston (#3) into Piston Housing (#8)

3. Attach the Thrust Plate (#5) with (4) Lockwashers (#73) and (4) Screws (#65) to the Piston (#3). **Torque to 25 Ft. Lbs.** Set this assembly aside until the brake stack is installed.

4. Set the Main Housing (#9) on a smooth work surface with the (3) Driver Pins (#210) facing up. Place the Hub Centering Spacer #601-43-003 into the Main Housing bore. *(See Figure 5.6 for dimensions to machine the Spacer.)* It can also be ordered from Force Control with the Part No. 601-43-003.

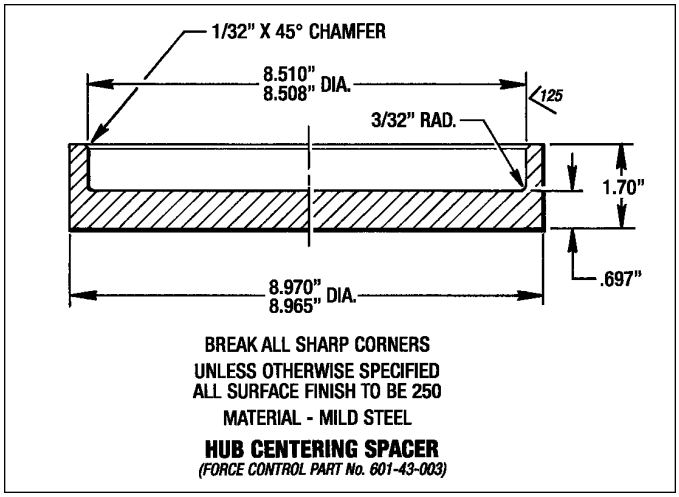

Figure 5.6 - Hub Centering Spacer

5. Manually place the Hub (#11) into the Hub Centering Spacer. **This is very important so that all the spline teeth in the Friction Discs (#12) are aligned with each other and are centered when the whole assembly is clamped down.** *(See Figure 5.7)*

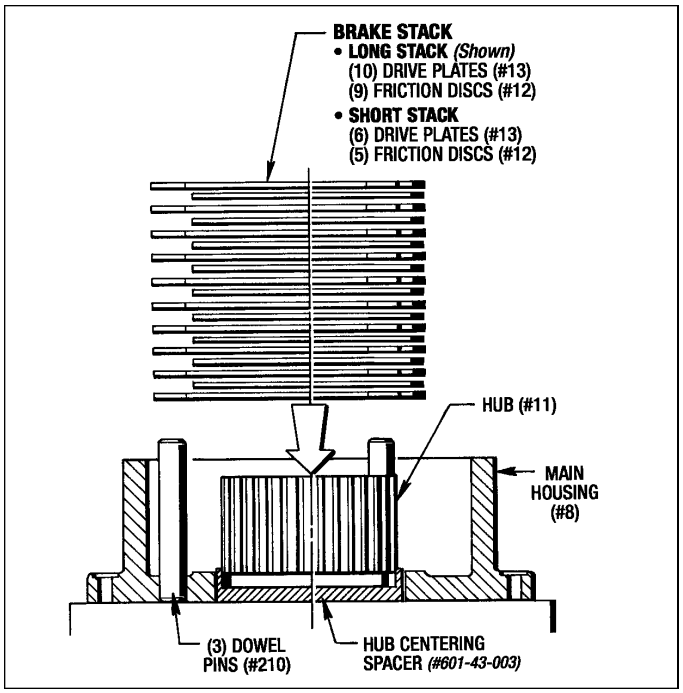

Figure 5.7 - Installing the Brake Stack

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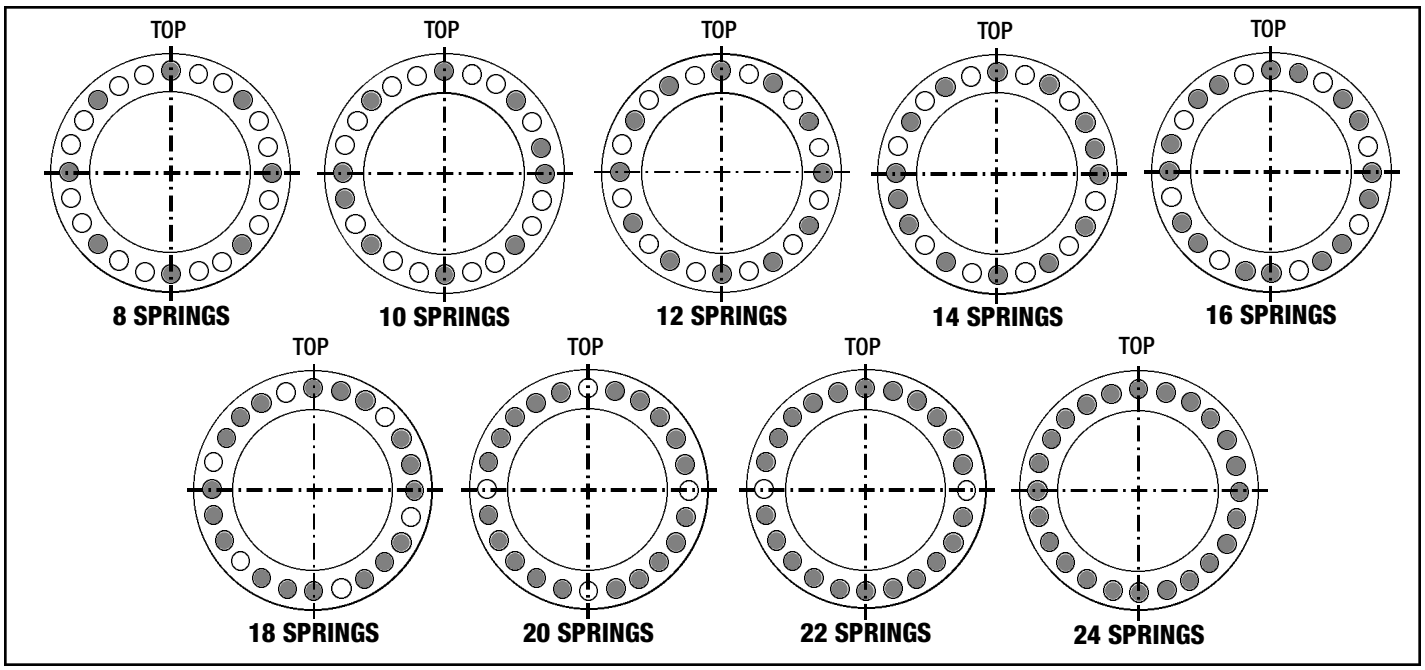

Figure 5.8 - Large E-Stop Brake Spring Placement

6. Install the **Brake Stack** onto the (3) Pins (#210) and the splined Hub (#11). Start with a Drive Plate (#13), then a Friction Disc (#12), then another Drive Plate (#13), etc. Ending with a Drive Plate (#13).

   NOTES: If you have a Long Stack there will be (10) Drive Plates (#13) and (9) Friction Discs (#12). There will be (6) Drive Plates (#13) and (5) Friction Discs (#12) for a Short Stack.

7. Place the Piston Housing and Piston Sub-Assembly onto the Main Housing (#9). Make sure the (3) Driver PIns (#210) are aligned with the (3) mating holes in the Piston Housing. Attach with (6) Screws (#66) and (6) Lockwashers (#74). **Torque to 60 Ft. Lbs.**

8. Set the End Housing on the work bench with the Spring Pins (#54) pointed up. Place the correct number of Springs (#40) over the spring pins. (See Figure 5.8 above for correct placement of these springs.)

9. Turn the Main Brake Assembly over and remove the Hub Centering Spacer. Lower this Assembly on to the End Housing.

10. Insert the (6) Screws (#67) and (6) Lockwashers (#74) and finger tighten them to just hold the brake together. Turn the brake over with the End Housing (#16) facing up. Tighten the (6) Screws down in an even manner to compress the Springs (#40) correctly. **Torque to 60 Ft Lbs.**

11. Manually pull the Hub (#11) out of the brake stack.

5-8 MOUNTING HUB AND LARGE E-STOP BRAKE ON MACHINE OUTPUT SHAFT

1. First check the output shaft and brake mounting surface for any nicks or burrs. Clean up and deburr if necessary.

2. Attach (2) Keys (#72) to the output shaft with (2) Screws (#76).

3. Lubricate the output shaft with white grease and slide the Hub (#11) on to it. Align the (2) set screw holes in the hub with the indent in each Key (#72). Tighten both Set Screws (#107).

4. Visually check to see if the teeth in the Friction Discs (#12) are aligned with each other. Apply 50 to 60 PSI to the brake port to release the brake stack and align the teeth if necessary.

5. Attach a 1/2”-13 eye bolt into the top of the brake and attach an overhead hoist to it.

   Slide the Brake Assembly on to the Hub (#11). The brake will require either (12) or (24) 20 mm mounting bolts, depending on the brake torque. Check the brake adapter plate for the quantity required. Attach the brake with the correct quantity of mounting bolts and lockwashers, which are both customer furnished. **Use Red Loctite #262 or #282 Thread-locker. Torque to 287 Ft. Lbs.**

   CAUTION - Be very careful not to damage the spline teeth in the Friction Discs (#12) when engaging the Hub (#11) spline.

6. Hook up pneumatic valve and piping. *(See Figure 3.1 for Pneumatic Control Circuit.)*

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Section 6
ORDERING REPAIR PARTS

6-1 GENERAL INFORMATION

This section illustrates, lists and describes all parts for the E-Stop Brake. Parts are identified on the exploded view drawings *(Figure 6.1 and Figure 6.2)* with Part Reference Numbers. These numbers correspond to the Part Reference Number given in the parts list. The Part Name and Quantity Used is also given in the parts list. The Part Number, Part Name and Quantity should all be used when ordering parts.

6-2 FACTORY REBUILD SERVICE

Reconditioning Service is offered by Force Control Industries, Inc. at the factory.

Contact Force Control Industries, Inc. for authorization and shipping instructions before returning a brake for this service. Force Control cannot be responsible for units returned to the factory without prior notice and authorization.

Care must be given to the packing of returned brakes. Always protect mounting feet and flanges by attaching to a suitable skid. Shipment-damaged units always delay repairs. It is usually impossible to recover damage costs from the carrier. Whenever possible, describe the problems you are having with your E-Stop Brake on the shipping papers.

Return to:

Force Control Industries,Inc.
3660 Dixie Highway
Fairfield, Ohio 45014

Phone: (513) 868-0900
Fax: (513) 868-2105
E-Mail: info@ forcecontrol.com

6-3 ORDERING REPLACEMENT PARTS

When ordering replacement parts, please specify all of the following information:

1. Brake Model Number *(On the Name Plate.)*
2. Brake Serial Number *(On the Name Plate.)*
3. Part Reference Number *(From the parts list or exploded view drawing.)*
4. Part Name *(From the parts list.)*
5. Quantity *(From the parts list.)*
6. Complete Shipping Information.

Failure to include information for items 1 through 6 will only delay your parts order. Unless another method is specified for item 6, parts weighing less than 150 Lbs. will be shipped United Parcel Service. Parts weighing more than 150 Lbs. will be shipped Motor Freight. Air freight and other transportation services are available but only if specified on your order.

6-4 NAME PLATE INFORMATION

This Name Plate is located on the Piston Housing.

See next page for Model No. Info.

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6-5 SMALL E-STOP BRAKE MODEL NUMBER

Example: Small E-Stop Brake with a Short Stack, with 34,900 Lb. Ins. of Torque (Ass'y. Configuration "L-G") and with a Bore Diameter of 3.4375"

1	2	3	4	5	6	7	8	9	10
E	S	–				–			–

E-Stop (1), (2)

Brake Size (3)

L	= Small Brake - Long Stack
S	= Small Brake - Short Stack

Revision (10)
(By Force Control)

Torque (4), (5),)6)
(Lb. Ins. x 1000)

LONG STACK	**0 6 7**	= 66,700 (Ass'y. Configuration "S-A")
	0 5 6	= 55,800 (Ass'y. Configuration "S-B")
	0 5 0	= 50,200 (Ass'y. Configuration "S-C")
	0 4 5	= 44,700 (Ass'y. Configuration "S-D")
	0 3 4	= 33,500 (Ass'y. Configuration "S-E")
SHORT STACK	**0 4 2**	= 41,900 (Ass'y. Configuration "S-F")
	0 3 5	= 34,900 (Ass'y. Configuration "S-G")
	0 3 1	= 31,400 (Ass'y. Configuration "S-H")
	0 2 8	= 27,900 (Ass'y. Configuration "S-J")
	0 2 1	= 20,900 (Ass'y. Configuration "S-K")
	0 1 4	= 13,900 (Ass'y. Configuration "S-L")
	0 1 0	= 10,400 (Ass'y. Configuration "S-M")

Bore Dia.(7), (8), (9)
(Inch)

4 0 0	= 4.000" Max.
3 8 8	= 3.875"
3 4 4	= 3.4375"
3 2 5	= 3.250"

Other Bore Diameters are available upon request.

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6-6 LARGE E-STOP BRAKE MODEL NUMBER

Example: Large E-Stop Brake with a Long Stack, with 216,300 Lb. Ins. of Torque (Ass'y. Configuration "L-B") and with a Bore Diameter of 6.000"

1	2	3	4	5	6	7	8	9	10
E	S	–	–			–			–

E-Stop (1), (2)

Brake Size (3)

M	= Large Brake - Long Stack
T	= Large Brake - Short Stack

Revision (10)
(By Force Control)

Torque (4), (5),)6)
(Lb. Ins. x 1000)

LONG STACK	2	3	6	= 236,000 (Ass'y. Configuration "L-A")
	2	1	6	= 216,300 (Ass'y. Configuration "L-B")
	1	9	7	= 196,600 (Ass'y. Configuration "L-C")
	1	7	7	= 177,000 (Ass'y. Configuration "L-D")
	1	5	7	= 157,300 (Ass'y. Configuration "L-E")
	1	3	7	= 137,600 (Ass'y. Configuration "L-F")
	1	1	9	= 118,800 (Ass'y. Configuration "L-G")
SHORT STACK	1	0	4	= 103,900 (Ass'y. Configuration "L-H")
	0	8	9	= 89,000 (Ass'y. Configuration "L-J")
	0	7	4	= 74,200 (Ass'y. Configuration "L-K")
	0	5	9	= 59,400 (Ass'y. Configuration "L-L")

Bore Dia.(7), (8), (9)
(Inch)

6	0	0	= 6.000" Dia. (Max).
5	0	0	= 5.000" Dia.
4	7	5	= 4.750" Dia.
3	8	8	= 3.875" Dia.

Other Bore Diameters are available upon request.

Consult factory for Thru Shaft.

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Repair Parts
Small E-Stop Brake

KEY No.	PART NAME	QTY.	KEY No.	PART NAME	QTY.
3	Piston	1	65	Soc. Hd. Cap Screw, 3/8”-16 x 1” Lg.	3
5	Thrust Plate	1	66	Soc. Hd. Cap Screw, 3/8”-16 x 1-3/4” Lg.	6
7	Adapter Plate	1	72	Key	1
8	Piston Housing	1	73	Lockwasher, 3/8”	3
9	Main Housing	1	74	Lockwasher, 3/8”	6
11	Hub	1	76	Soc. Hd. Cap Screw	
*12	Friction Disc			(3.25” Bore) 5/16”-16 x 5/8” Lg.	1
	Long Stack	8		(3.44”, 3.88” & 4.00” Bore) 3/8”-16 x 1” Lg	1
	Short Stack	5	107	Soc. Set Screw	1
*13	Drive Plate		120	Stud, 3/8”-16 x 6-1/2” Lg.	10
	Long Stack	9	121	Hex Nut, 3/8”-16	10
	Short Stack	6	122	Lockwasher, 3/8”	10
16	End Housing	1	139	Roll Pin	2
*40	Spring	AR	210	Dowel Driver	5
*43	O-Ring	1	211	Dowel Pin, 3/8” x 1” Lg.	2
*44	O-Ring	2	224	Freeze Plug	6
*50	Liner-Teflon, I.D. Sealing	1	*380	Filler Plate (“S-F” thru “S-M” Ass’y. Config.	
*51	Liner-Teflon, O.D. Sealing	1		with “L” Long Housing)	8
54	Roll Pin	12			

* Parts included in Overhaul Repair Kit.
AR - As Required *(See Page 2 for Quantity Used.)*

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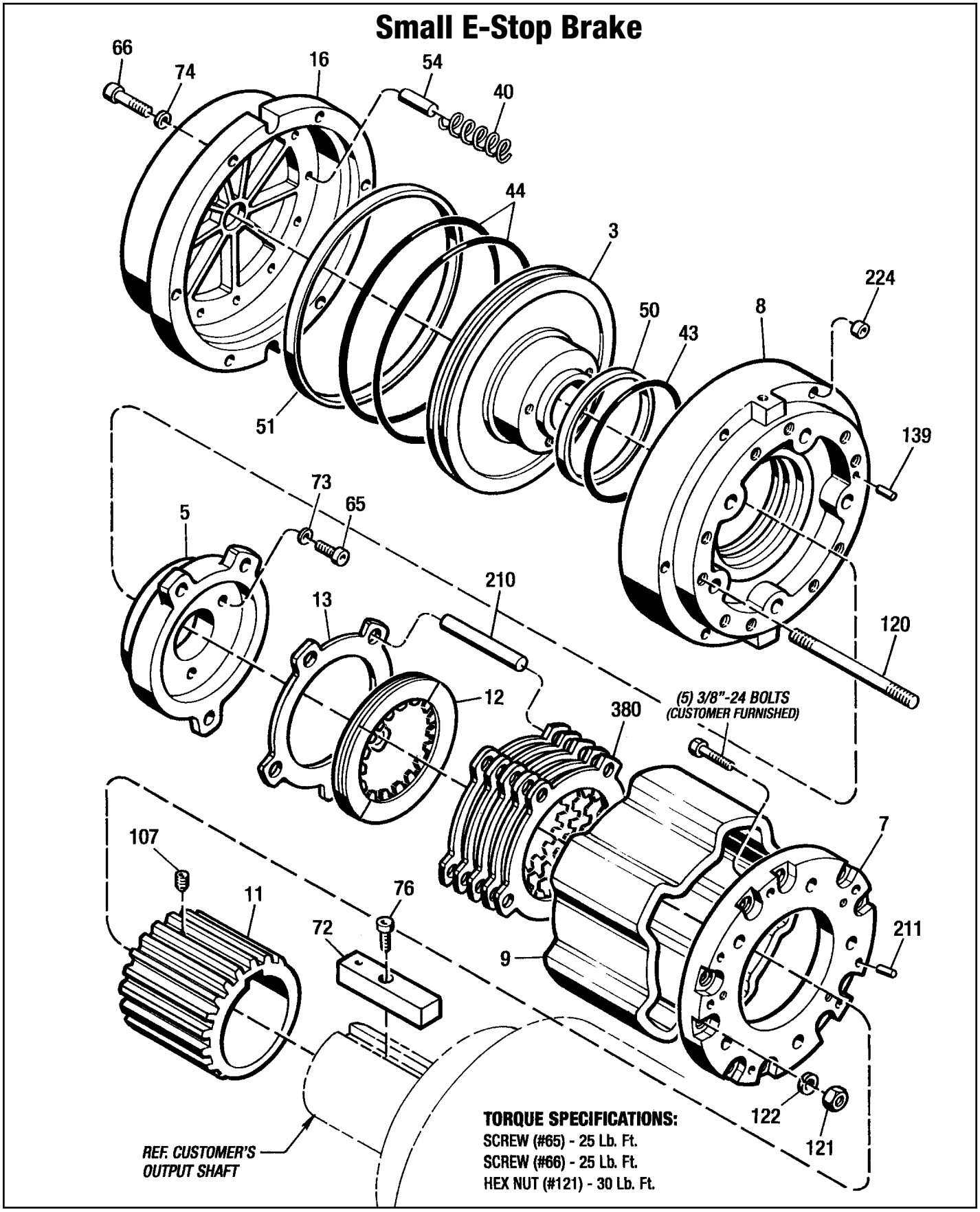

Figure 6.1 - Small E-Stop Brake Repair Parts

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Repair Parts
Large E-Stop Brake

KEY No.	PART NAME	QTY.	KEY No.	PART NAME	QTY.
3	Piston	1	*43	O-Ring	1
5	Thrust Plate	1	*44	O-Ring	2
7	Adapter Plate	1	*50	Liner, Teflon	1
8	Piston Housing	1	*51	Liner, O.D. Sealing	1
9	Main Housing	1	54	Roll Pin	AR
11	Hub	1	65	Soc. Hd. Cap Screw, 3/8”-16 x 1-1/2” Lg.	4
*12	Friction Disc		66	Soc. Hd. Cap Screw, 1/2”-13 x 2” Lg.	6
	Long Stack	9	67	Soc. Hd. Cap Screw, 1/2”-13 x 2-1/4” Lg.	6
	Short Stack	5	72	Key	2
*13	Drive Plate		73	Lockwasher, 3/8	4
	Long Stack	10	74	Lockwasher, 1/2	12
	Short Stack	6	76	Soc. Hd. Cap Screw, 3/8”-16 x 1-1/2” Lg.	2
16	End Housing	1	107	Soc. Set Screw, 3/8”-16 x 5/8” Lg.	2
*40	Spring	AR	210	Dowel Driver	5

* Parts included in Overhaul Repair Kit.
AR - As Required *(See Page 3 for Quantity Used.)*

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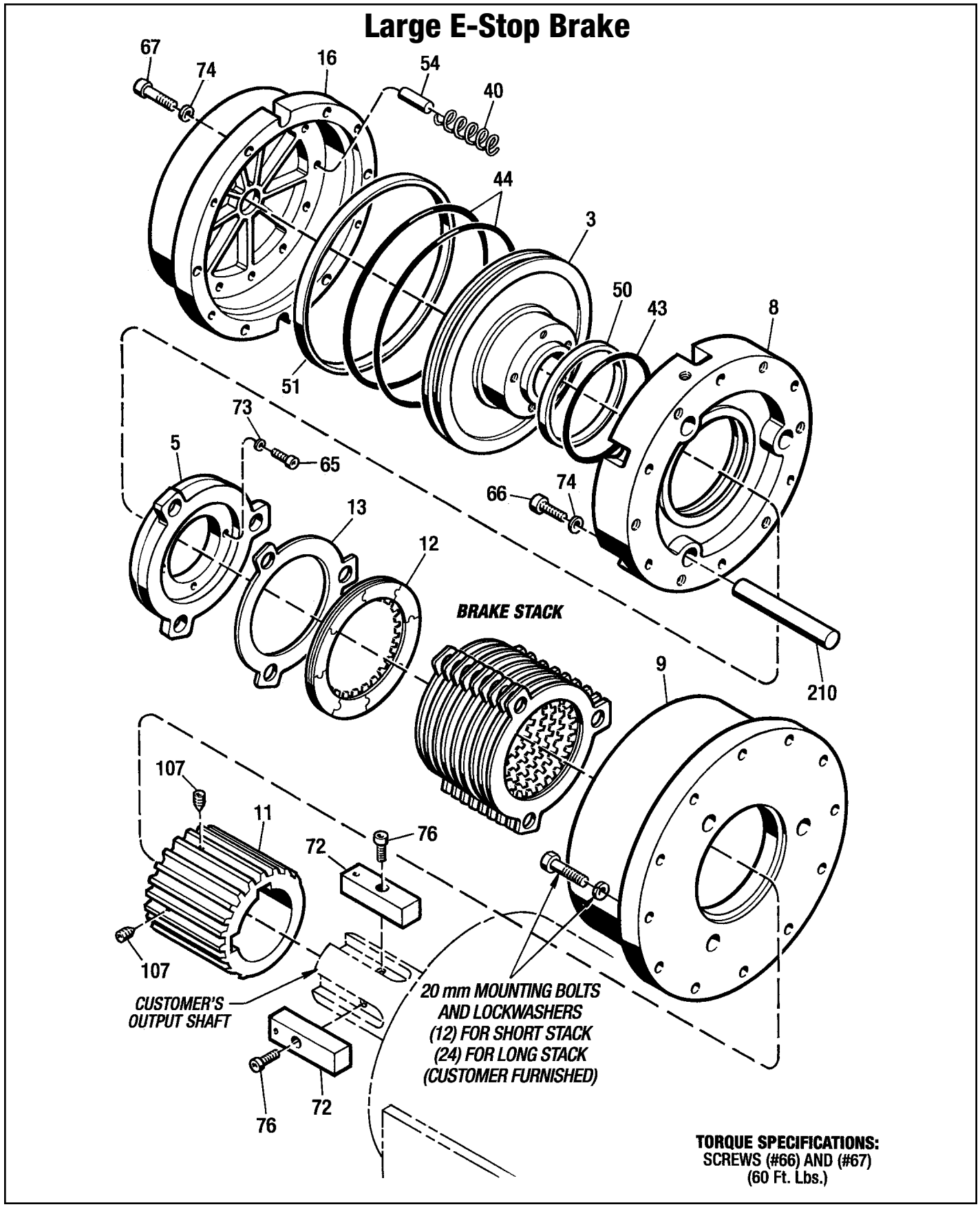

Figure 6.2 - Large E-Stop Brake Repair Parts

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